CLAIMS

1. A method of determining particle transmittance of a filter in a particle detection system, the method comprising the steps of:

detecting a level of first particles having a size indicative of smoke particles and which pass through the detection system;

determining an integrated smoke hours value by integrating the detected level of first particles over time;

estimating the smoke particle transmittance of the filter by applying a predetermined weighting operation to the integrated smoke hours value.

2. The method of claim 1 wherein, the predetermined weighting operation comprises the step of multiplying the integrated smoke hours value by a predetermined multiplier value.

3. A method of determining particle transmittance of a filter in a particle detection system, the method comprising the steps of:

detecting a level of first particles having a size indicative of smoke particles and which particles are suspended in air passing through the detection system;

determining the flow rate of air passing through the detection system;

determining an integrated smoke hours value by integrating the detected level of first particles over time;

determining an estimated smoke particle transmittance of the filter in accordance with an operation comprising multiplying the integrated smoke hours value with the determined flow rate.

4. The method of any one of claims 1 to 3 wherein, the step of determining an integrated smoke hours value comprises the following integration formula:

$$x = \int a\,(bS^c + dS)\,dt$$

where

x = measure of filter lifetime used (integrated smoke hours);

S = recorded smoke level (percentage (%) obscuration/metre) measured at exit of filter at any instant in time;

t = time; and,

a, b, c and d are coefficients established from empirical testing of a given filter within a predetermined configuration of a particle detection system.

5. The method of claim 3 wherein, the step of determining an integrated smoke hours value comprises the following integration formula:

$$x = \int (a (bS^c + dS))\, dt \times eFR$$

where

x = measure of filter lifetime used;

FR = Flow Rate of air in detector system being a constant value;

e is a coefficient established from empirical testing of a given configuration of a particle detection system;

S = recorded smoke level (percentage (%) obscuration/metre) measured at exit of filter at any instant in time;

t = time; and,

a, b, c and d are coefficients established from empirical testing of a given filter within a predetermined configuration of a particle detection system.

6. A method of determining particle transmittance of a filter in a particle detection system, the method comprising the steps of:

detecting a level of first particles having a size indicative of smoke particles and which particles are suspended in air passing through the detection system;

determining the flow rate of air passing through the detection system;

determining a smoke hours value corresponding to the detected level of first particles;

determining an estimated smoke particle transmittance of the filter in accordance with an operation comprising multiplying the smoke hours value with the determined flow rate and integrating the operation over time.

7. The method of claim 6 wherein, the step of determining an estimated smoke particle transmittance comprises the following integration formula:

$$x = \int a\,(bS^c + dS) \times eFR\,)\,dt$$

where

x = measure of filter lifetime used;

FR = Flow Rate of air in detector system being a variable value;

e is a coefficient established from empirical testing of a given configuration of a particle detection system;

S = recorded smoke level (percentage (%) obscuration/metre) measured at exit of filter at any instant in time;

t = time; and,

a, b, c and d are coefficients established from empirical testing of a given filter within a predetermined configuration of a particle detection system.

8. A method of monitoring a filter in a particle detection system, the method comprising the steps of:

performing the method of any one of claims 1 to 7;

detecting a level of second particles, having a size indicative of dust particles, passing through the detection system;

providing a cumulative count over time of the number of detected second particles;

determining an estimated combined first and second particle transmittance by combining the cumulative count of detected second particles and the estimated smoke particle transmittance

comparing the estimated combined particle transmittance to a first threshold value at which, it is predetermined that the amount of smoke particles arrested by the filter has reached a first warning level;

indicating a first level filter warning when the estimated combined particle transmittance is less than or equal to the first threshold value;

comparing the estimated combined particle transmittance to a second threshold value at which, it is predetermined that the amount of smoke arrested by the filter has reached a second warning level and;

indicating a second level filter warning when the estimated combined particle transmittance is less than or equal to the second threshold value.

9. The method of claim 8 wherein the first threshold level corresponds to a reduction in particle transmittance between about 2% and about 40%.

10. The method of claim 8 wherein the second threshold level corresponds to a reduction in particle transmittance between about 10% and about 70%.

11. The method of claim 8 wherein, the period of time in which the integration is performed ranges from the time at which the detector begins operation with a new filter until either:

(c) the estimated combined particle transmittance is less than or equal to the first threshold value, at which time the first level filter warning indicates that the filter requires replacing; or,

(d) the estimated combined particle transmittance is less than or equal to the second threshold value, at which time the second level filter warning indicates a critical fault where filter end-of-life is signalled.

12. The method of any one of claims 1 to 11 wherein, the particles are detected prior to entering the filter of the detection system.

13. The method of any one of claims 1 to 11 wherein, the particles are detected after exiting the filter of the detection system.

14. The method of any one of claims 8 to 13 further comprising the step of:

adjusting the sensitivity of a detector of the particle detection system in accordance with at least one of:

a) the estimated smoke particle transmittance;

b) the cumulative count of detected second particles;

c) the estimated combined particle transmittance.

15. Apparatus adapted to determine particle transmittance for a filter of an aspirated particle detector system, said apparatus comprising:

processor means adapted to operate in accordance with a predetermined instruction set,

said apparatus, in conjunction with said instruction set, being adapted to perform the method of any one of claims 1 to 7.

16. Apparatus for monitoring a filter of a particle detection system, the apparatus comprising:

processor means adapted to operate in accordance with a predetermined instruction set,

said apparatus, in conjunction with said instruction set, being adapted to perform the method of any one of claims 8 to 14.

17. A method of indicating particle transmittance including:

Detecting the amount of smoke passing through a detection chamber

Summing the amount of detected smoke passing through the detection chamber over time to ascertain total integrated smoke hours;

Comparing the total amount of smoke passed through the detection chamber with a predetermined value;

Sending a signal indicating when the total integrated smoke hours has exceeded the predetermined value.

18. A computer program product comprising:

a computer usable medium having computer readable program code and computer readable system code embodied on said medium for determining particle transmittance of a filter in a particle detection system within a data processing system, said computer program product comprising:

computer readable code within said computer usable medium for performing the method steps of any one of claims 1 to 7.

19. A computer program product comprising:

a computer usable medium having computer readable program code and computer readable system code embodied on said medium for monitoring a filter in a particle detection system within a data processing system, said computer program product comprising:

computer readable code within said computer usable medium for performing the method steps of any one of claims 8 to 14.

20. A computer program product comprising:

a computer usable medium having computer readable program code and computer readable system code embodied on said medium for indicating particle transmittance within a data processing system, said computer program product comprising:

computer readable code within said computer usable medium for performing the method steps of claim 17.

21. A method substantially as herein disclosed with reference to at least one of the accompanying drawings.

22. A system or apparatus as herein disclosed with reference to at least one of the accompanying drawings.